REGULAR ORIGINAL FILING

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Inventors: Thomas M. Stephany, Majid Rabbani, John R. Squilla and Donald E. Olson
Customer No. 01333

A METHOD FOR AUTHENTICATING ANIMATION

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A METHOD FOR AUTHENTICATING ANIMATION

FIELD OF THE INVENTION

The present invention relates to producing and transmitting animation and, more particularly, to encrypting such animation before transmission for producing a secure animation that is essentially tamper-proof during transmission.

BACKGROUND OF THE INVENTION

Animation typically includes a three-dimensional wire mesh produced from an image and a texture model that represents the visual features associated with the wire mesh. A set of movement instructions is produced for directing movement of the wire mesh. When the instructions are input to the wire mesh having the texture model residing thereon, a three-dimensional moving image is produced.

Typically, the wire mesh, texture model and instructions are sent to a customer for their entertainment and/or use.

Although the presently known and utilized animation creation and transmission components are satisfactory, they include drawbacks. During transmission, such components may be intercepted and undesirably modified.

Consequently, a need exists for a secure method for transmitting such animation that is essentially tamper-proof.

SUMMARY OF THE INVENTION

The present invention is directed to overcoming one or more of the problems set forth above. Briefly summarized, according to one aspect of the present invention, the invention resides in a method for authenticating animation, the method comprising the steps of (a) capturing an image; (b) converting the captured image into a wire mesh data for permitting animation of the image; (c) providing movement data, which directs movement of the wire mesh data, and texture data indicating the covering for the wire mesh; (d) electronically transmitting the wire mesh data, texture data and movement data; (e) encrypting

the movement data; and (f) electronically transmitting the encryption the movement data for verifying that the animation is unaltered during transmission from its source.

The above and other objects of the present invention will become more apparent when taken in conjunction with the following description and drawings wherein identical reference numerals have been used, where possible, to designate identical elements that are common to the figures.

Advantageous Effect Of The Invention

The present invention has the advantage of electronically transmitting animation that is essentially tamper-proof.

The present invention includes the feature of encrypting the animation before transmission for insuring verification that the animation is unaltered.

These and other aspects, objects, features and advantages of the present invention will be more clearly understood and appreciated from a review of the following detailed description of the preferred embodiments and appended claims, and by reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a digital camera of the present invention;

Fig. 2 is a diagram of an animation processor, a corresponding flow chart illustrating creation of a typical animation from the processor and a corresponding wire mesh produced from the processor;

Fig. 3 is a process flowchart illustrating the method of the present invention for securely transmitting an animation; and

Fig. 4 is a perspective view of a typical wire mesh.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, a portion of the present invention will be described in the preferred embodiment as a software program. Those skilled in

the art will readily recognize that the equivalent of such software may also be constructed in hardware.

Referring to Fig. 1, there is shown a digital camera 10 for capturing digital images. The digital camera 10 includes an image sensor (not shown) for capturing the incident light and converted it into electronic signals. Such digital cameras 10 are well known in the art and will not be discussed further detail herein. Similarly, it should be understood by those skilled in the art that the camera 10 could also be a film based camera whose images are digitized for animation after processing of the film.

Referring to Fig. 2, there is shown an animation processor 20 and a flow chart for producing the animation. As is well known to those skilled in the art, the animation processor 20 includes electronic components therein for producing wire mesh, texture (or skinning) information and movement instructions for the animation. In this regard, the animation process is initiated S2, and the processor 20 produces S4 a three-dimensional wire mesh 30 from the digital image input by the user. Referring briefly to Fig. 4, the wire mesh 30 is a plurality of interconnecting segments 35 that forms a model of the exterior shape of the input image. Referring back to Fig. 2, the processor 20 further analyzes the input image, and produces S6 a texture model for each image for producing a digital representation of the exterior, visible features of the image. The user will instruct the animation processor 20 as to the particular movements desired for the image. From these instructions, the animation processor 20 produces S8 movement data that directs the individual segments of the wire mesh to deform thus producing movement. The animation processor 20 outputs S10 the wire mesh, texture and corresponding movement instructions to the user in a file structure. This process may be repeated for a subsequent image or simply produce different movement instructions for an existing wire frame.

Referring to Fig. 3, there is shown a flow diagram of the present invention for sending the wire mesh 30a, texture database 40a, and movement instructions (wire mesh database) 50a to a user which ensures all of these components have not been modified or altered during transmission. In this regard, the wire mesh 30a, textured database 40a and movement instructions 50a

produced by the animation processor is sent to a user, such as via the Internet or manual distribution and the like. The sender then encrypts the texture database 40b, wire mesh 30b and wire mesh database 50b with a private key 60 for producing a secure executable file 70 which is essentially tamper proof. The sender may send this encryption via any suitable means, such as via the Internet or manual distribution and the like, or it may be send as an attachment to the unencrypted file.

The receiver of the digital files then decrypts 80 the texture database 40b, wire mesh 30b and wire database 50b with a public key. The public key may be sent to the user by the sender, or may be retrieved from publicly accessible facilities, such as the Internet and the like. As well known to those skilled in the art, the public key may only decrypt the digital files, whereas the private key can encrypt and decrypt. Such encryption and decryption technology is well known in the art and will not be discussed in detail herein. The customer then compares 90 the decrypted texture 40b, wire mesh 30b and wire database 50b with the originally received texture database 40a, wire mesh 30a and wire database 50a. This comparison may be performed by any suitable computer having code for performing such task, which code requires minimal computer skills to prepare and, as a result, will not be discussed in detail herein.

If the decrypted texture 40b, wire mesh 30b and wire database 50b is the same as the originally sent texture database 40a, wire mesh 30a and wire database 50a, the animation is verified as being unmodified during transmission. If they are not the same, the originally sent animation has been modified without proper authority.

In an alternative embodiment, in lieu of encrypting the duplicate wire mesh 30b, duplicate texture database 40b and duplicate wire mesh database (collectively referred to as duplicates), each or any one of these could be "hashed" and then encrypted before sending to the customer. In this regard, hashing includes passing all or each of the desired duplicates through an algorithm for converting it into a unique smaller representation, which is well known in the art. One example of a hashing algorithm is the SHA-1 algorithm as specified in FIPS

PUB 180-1, which hashes any given size data to only 20 bytes. This hash is then encrypted and sent to the customer where the hash is decrypted.

The customer then passes the corresponding original (either or all of the wire mesh 30a, texture database 40a and wire mesh 50a) through the same hashing algorithm for obtaining a corresponding smaller unique representation. As is well known in the art, any alteration of the data that is subsequently hashed with a cryptographically strong hashing function is likely to result in a different hash from a hash of the unaltered data, which obviously indicates that the data has been altered. The user or customer then compares the two hashes for verifying whether the data has been altered.

The invention has been described in detail with particular reference to certain preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

PARTS LIST

10	digital camera
20	animation processor
30	wire mesh
35	interconnecting segments
30a	wire mesh
30b	wire mesh
40a	texture database
40b	texture database
50a	movement instructions (wire mesh database)
50b	movement instructions (wire mesh database)
60	private key
70	executable file
80	customer decrypts
90	customer compares
S2	process initiated
S4	produce wire mesh
S6	produce textures
S8	produce movement instructions
S10	output